

WHAT WE CLAIMED IS:

1. A gas turbo pump assembly for coupling to a chamber port, comprising:

a turbo pump having a pump body with an external surface and a center axis that defines a first axial end and a second axial end of said pump, a pump inlet port, said pump inlet port being disposed at said first axial end of said pump and being coupled to said chamber port, and an exit port disposed proximate said second axial end of said pump; and

a vibration damping assembly, disposed to enclose a significant portion of said pump body in a nested arrangement.

2. The turbo pump assembly as recited in claim 1, wherein said turbo pump is coupled to a rigid mounting structure at said pump inlet port via said vibration damping assembly.

3. The turbo pump assembly as recited in claim 2, wherein said vibration damping assembly is coupled between said rigid mounting structure and at least a first coupling portion at said first axial end of said pump and a second coupling portion on the pump body disposed between said first axial end and said second axial end of said pump.

4. The turbo pump assembly as recited in claim 3, wherein said coupling portion comprises a radially extended structure integrally formed on said body.

5. The turbo pump assembly as recited in claim 1, wherein said vibration damping assembly comprises a first connection structure, said first connection structure being a flexible damping structure having a first end and a second end and being coupled between said rigid mounting structure at the first end and said pump at the second end.

6. The turbo pump assembly as recited in claim 5, wherein said vibration damping assembly further comprises a second connection structure, said second connection structure being a rigid structure having a first end and a second end and being coupled between said pump at its first end and the second end of said first connecting structure at the second end of said second connection structure

7. The turbo pump assembly as recited in claim 5, wherein said vibration damping assembly comprises a flexible bellows.

8. The turbo pump assembly as recited in claim 5, wherein said vibration damping assembly further comprises a second flexible connection structure, said second connection structure being a flexible structure having a first end and a second end and being coupled between said pump at said first axial end and the second end of said first connecting structure at said second end of said second connection structure.

9. The turbo pump assembly as recited in claim 8, wherein said vibration damper comprises at least one flexible bellows.

10. The turbo pump assembly as recited in claim 9, wherein both said first connection structure and said second structure are flexible and are adapted to reduce both compression and extraction forces.

11. The turbo pump assembly as recited in claim 1, wherein said vibration damping assembly comprises a first connection structure and a second connection structure, said first connection structure being a rigid support structure having a first end and a second end and being coupled between a rigid mounting structure at the first end and said second connection structure at the second end, said second connection structure being flexible and being coupled between said pump at said first axial end and said first connection structure .

12. The turbo pump assembly as recited in claim 11, wherein said vibration damper comprises a flexible bellows.

13. The turbo pump assembly as recited in claim 11, wherein said flexible bellows is connected for extraction by atmospheric pressure.

14. The turbo pump assembly as recited in claim 1, wherein said exit port is disposed proximate said second axial end of said pump, and is not covered by said vibration damping assembly.

15. The turbo pump assembly as recited in claim 1, wherein said body external surface further comprises an axial portion defining a side surface and an end portion, said end portion being substantially radially extended from said center axis to said axial portion and defining a bottom portion and being adapted for receiving facilities connections.

16. The turbo pump assembly as recited in claim 15, wherein pump facilities connected through said bottom portion comprise one or more of a rough pumping port, cooling water inlet and outlet, bearings gas purge and electrical connections.

17. The turbo pump assembly as recited in claim 1, wherein said major portion comprises between 50% and 70% of an external side surface of said body.

18. The turbo pump assembly as recited in claim 4, wherein said coupling portion comprises a ring extended around said body.

19. The turbo pump assembly as recited in claim 4, wherein said coupling portion comprises a plurality of flanges disposed around said body.

20. The turbo pump assembly as recited in claim 6 where the vibration damping assembly defined by the first connection structure and the second connection structure is substantially cone shaped.

21. The turbo pump assembly as recited in claim 11 where the vibration damping assembly defined by the first connection structure and the second connection structure is substantially cone shaped.

22. A method of reducing the effect of vibration in a gas turbo pump assembly for connection to an inlet port, which defines a rigid mounting structure, comprising:

providing a mounting structure on said turbo pump at a first axial end; and

connecting a vibration damping assembly to said rigid mounting structure at one end thereof and to the turbo pump at another end thereof in order to enclose a substantial portion of said turbo pump in a nested arrangement.

23. A vibration damping assembly for substantially enclosing a gas turbo pump in a nested fashion, and securing the pump to an inlet port, comprising:

a vibration damping structure defining an enclosure having at axially opposed ends a first opening and a second opening, respectively, said first opening being adapted for coupling to an inlet port and said second opening being adapted to receive therein a substantial portion of the pump, said vibration damping structure comprising a first connection structure, said first connection structure being a flexible damping structure having a first end and a second end and being adapted for coupling between a rigid mounting structure at a first end and said pump at said second end.

24. The vibration damping assembly as recited in claim 23, wherein said vibration damping assembly further comprises a second

connection structure, said second connection structure being a rigid structure having a first end and a second end and adapted to being coupled between said pump at its first end and the second end of said first connecting structure at its second end.

25. The vibration damping assembly as recited in claim 23, wherein said vibration damping assembly comprises a flexible bellows.

26. The vibration damping assembly as recited in claim 23, wherein said vibration damping assembly further comprises a second connection structure, said second connection structure being a flexible structure having a first end and a second end and adapted to being coupled between said pump at its first end and the second end of said first connecting structure at its second end.

27. The vibration damping assembly as recited in claim 26, wherein said vibration damper comprises at least one flexible bellows.

28. A vibration damping assembly for substantially enclosing a gas turbo pump in a nested fashion, and securing the pump to an inlet port, comprising:

a vibration damping structure defining an enclosure having at axially opposed ends a first and second opening, respectively, said first opening being adapted for coupling to an inlet port and said second opening being adapted to receive therein a substantial portion of the pump, said vibration damping structure comprising a first connection structure and a second connection structure, said first connection structure being a rigid support structure having first and second ends and being adapted to being coupled between a rigid mounting structure at the first end and said second connection structure at the second end, said second connection structure being flexible and being coupled between said pump body at said first axial end and said first connection structure.

29. The turbo pump assembly as recited in claim 28,
wherein said vibration damper comprises a flexible bellows.